REFLECTION-DIFFUSION STRUCTURE ADOPTED FOR A LIGHTGUIDE PLATE

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a reflection-diffusion structure adopted for a lightguide plate, and particularly relates to a reflection-diffusion structure adopted for a lightguide plate made integrally in one piece.

2. Background of the Invention

Since the quality of LCD improves daily, the price thereof accordingly falls and the fields application for the LCD have rapidly increased to indude devices such as a calculator, a monitor, a navigation system, a scanner, a panel of a cell phone, or a notebook. A backlight module of the LCD plays an important role because of the monopolizing power of 75% above and costs of 3% to 5%; accordingly, high uniformity, high luminance, low price, low power consumption, simple structure, thinness and light weight of the backlight module have become important problems for the industry.

The backlight module conventionally includes a lightguide plate, a light, a diffuser, and a reflector. The diffuser and the reflector are respectively adhered onto the lightguide plate to serves as a conventional reflection-diffusion structure. Referring to FIG. 1, the conventional reflection-diffusion structure adopted for a conventional lightguide plate 10 includes a light 14a, a reflector 12a and a diffuser 13a. The light 14a is installed on the conventional lightguide plate 10, the reflector 12a is installed under the conventional lightguide plate 10, and the diffuser 13a is installed over the conventional lightguide plate 10. A conventional method adopted for the diffuser 13a and the reflector 12a respectively adhered onto the conventional

lightguide plate 10 includes providing four sticks 111a and 112a respectively adhered onto four sides of an upper and a lower surfaces of the conventional lightguide plate 10, adhering the reflector 12a onto the four sticks 111a of the lower surface of the conventional lightguide plate 10, folding four folds of the reflector 12a respectively adhered onto the four sticks 112a of the upper surface of the conventional lightguide plate 10, and then applying another four sticks 113a onto the four folds of the reflector 12a for contacting the diffuser 13a. This method requires at least three layers of sticks and increases a thickness of the backlight module and the number of manufacturing steps. Further, an effective visible area is formed thereon and the effective visible area may be covered by the four sticks on four sides thereof and be diminished. If the effective visible area needs to be enlarged, sides of the reflector 12a, the diffuser 13a and the conventional lightguide plate 10, respectively, must be increased, which is more expensive. If the sticks increase in width, more and more light is retained and illumination efficiency is accordingly lessened. Hence, an improvement over the prior art is required to overcome the disadvantages thereof.

SUMMARY OF INVENTION

The primary object of the invention is therefore to specify a reflection-diffusion structure adopted for an integral, one-piece lightguide plate, making manufacturing thereof easier and cheaper.

The secondary object of the invention is therefore to specify a reflection-diffusion structure adopted for an integral, one-piece lightguide plate that is thin and light-weight.

According to the invention, this object is achieved by a reflection-diffusion structure adopted for a lightguide plate including a left wall,

a right wall, and a bottom wall, all made of reflection materials, a top wall connecting the bottom wall, the left wall and the right wall, and a receiving cavity formed by the left wall, the right wall, the top wall and the bottom wall. Then top wall includes a size-adjustable diffusion area made of a diffusion material. The left wall, the right wall, the top wall and the bottom wall are made integrally in one piece. The reflection material and the diffusion material are also made integrally in one piece.

To provide a further understanding of the invention, the following detailed description illustrates embodiments and examples of the invention. Examples of the more important features of the invention thus have been summarized rather broadly in order that the detailed description thereof that follows may be better understood, and in order that the contributions to the art may be appreciated. There are, of course, additional features of the invention that will be described hereinafter and which will form the subject of the claims appended hereto.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other features, aspects, and advantages of the present invention will become better understood with regard to the following description, appended claims, and accompanying drawings where:

FIG. 1 is a perspective view of a conventional lightguide plate;

FIG. 2 is a perspective view according to a first embodiment of the present invention reflection-diffusion structure;

FIG. 3 is a perspective view according to a second embodiment of the present invention reflection-diffusion structure;

FIG. 4 is a perspective view according to a third embodiment of the present invention reflection-diffusion structure; and

FIG. 5 is a perspective view according to a fourth embodiment of the present invention reflection-diffusion structure.

DETAILED DESCRIPTION OF THE EMBODIMENTS

With respect to FIG. 2, the present invention provides a reflection-diffusion structure adopted for a lightguide plate 20 and a light 24, in which the light 24 is a CCFL (Cold Cathode Fluorescent Lamp), an EL (Electro Luminescence), an LED (Liquid Crystal Display), or a OLED (Organic Liquid Crystal Display). The reflection-diffusion structure includes a left wall 214 made of a first reflection material, a right wall 213 relating to the left wall 214 and made of a second reflection material, a bottom wall 212 connecting the left wall 214 and the right wall 213 and made of a third reflection material, and a top wall 211 relating to the bottom wall 212 and connecting the left wall 214 and the right wall 213. The reflection-diffusion structure includes further includes a receiving cavity 25 formed by the left wall 214, the right wall 213, the top wall 211 and the bottom wall 212 for receiving the lightguide plate 20 and a light 24. The top wall 211 includes a size-adjustable diffusion area 22 made of a diffusion material and a size-adjustable reflection area 23, made of a fourth reflection material, and mating with the diffusion area 22 for modifying a size of the diffusion area 22. The diffusion area 22 therefore occupies less than 100% of the top wall 211.

The left wall 214, the right wall 213, the top wall 211 and the bottom wall 212 are made integrally in one piece, and the fourth reflection material, the first reflection material, the second reflection material, the third reflection material and the diffusion material are made integrally in one piece by injection molding. The first reflection material, the second reflection material, the third reflection material, the fourth reflection material and the diffusion material are made from

plastic materials. The first reflection material, the second reflection material, the third reflection material, and the fourth reflection material are made of opaque materials, and the diffusion material is transparent and has a matte-finished face.

The reflection-diffusion structure further includes two reflection members 26 disposed on two opposing ends of each of the left wall 214, the right wall 213, the top wall 211 and the bottom wall 212 to wrap completely the lightguide plate 20 therein. Referring to FIG. 3, a second embodiment of the present invention, the present further includes the two reflection members 26 respectively extending from the opposing ends of the bottom wall 212, and folding upwardly to connect the top wall 211 with four sticks 27. A third embodiment of the present invention, the left wall 214, the right wall 213, the top wall 211 and the bottom wall 212 are made integrally in one piece in a sheet shape.

The reflection-diffusion structure further includes a overlapping piece 215 connecting to the top wall 211 or the bottom wall 212 for overlapping and connecting the right wall 213 or the left wall 214. The overlapping piece 215 is made of a fifth reflection material. The two reflection members 26 are disposed on two opposing ends of each of the left wall 214, the right wall 213, the top wall 211 and the bottom wall 212, and in particular, as illustrated in FIG. 4, the overlapping piece 215 connecting the bottom wall 212 for overlapping and connecting the left wall 214.

Referring to FIG. 5, which illustrates a fourth embodiment of the present invention, the receiving cavity 25 is formed by the left wall 214, the right wall 213, the top wall 211 and the bottom wall 212, which all are folded into a hollow box. The two reflection members 26 respectively extend from the

opposing ends of the bottom wall 212, and fold upwardly to connect the top wall 211 with the four sticks 27.

Accordingly, the present invention uses fewer sticks to provide a simple structure and easy manufacturing, and the thickness of the backlight module is decreased. The present invention prevents light retention due to the sticks covering four sides of the top wall 211, and luminance will be raised by 3% by removing a layer of sticks.

It should be apparent to those skilled in the art that the above description is only illustrative of specific embodiments and examples of the invention. The invention should therefore cover various modifications and variations made to the herein-described structure and operations of the invention, provided they fall within the scope of the invention as defined in the following appended claims.